Unsupervised Clustering Land Cover Mapping

Purpose

To produce a land cover map of your 15 km x 15 km GLOBE Study Site

Overview

Students map land cover using a computer to recognize similar *spectral patterns* within the digital, 512 x 512 pixel Landsat Thematic Mapper data set provided by GLOBE for their GLOBE Study Site. These maps, classified to MUC level 4, will help scientists check the accuracy of worldwide land cover maps derived from satellite imagery.

Time

Several class periods

Level

Intermediate and Advanced

Frequency

One time, but may be an iterative process as you progressively investigate more areas within your GLOBE Study Site

Key Concepts

Land Cover classes
MUC Classification scheme
Clustering using spectral patterns

Skills

Using computers and MultiSpec software
Creating a land cover map

Materials and Tools

Computer

MultiSpec computer software (provided by GLOBE or downloaded from the Web)
512 x 512 pixel TM image data of your 15 km x 15 km GLOBE Study Site (provided by GLOBE)
MUC Land Cover Classification System and definitions

Preparation

Review the MUC Land Cover Classification Chart. Discuss and evaluate local examples of land cover, review topographic maps, and discuss classification.

Review the *MultiSpec Introduction to Image Processing* and *Unsupervised Classification - Clustering* in the *Toolkit*

Prerequisites

Odyssey *of the Eyes* and *Some Like it Hot Learning Activities*

In this protocol, GLOBE schools use the MultiSpec software to map land cover types. Students tentatively identify areas of similar land cover using the computer to recognize similar *spectral patterns* within the digital, 512 x 512 pixel Landsat TM data set for their area. These areas are grouped into *clusters*. The computer identifies and clusters together pixels in the image which have the most similar spectral properties. The software assigns each cluster an arbitrary color. Students then classify the land cover type of each cluster using the four levels of the MUC system.

Step 1: Create Your Map

- ❑ Start the MultiSpec program on your computer.
- ❑ Open the file containing the TM image of your GLOBE Study Site.
- ❑ Create a new project and select Cluster from the Processor menu.
- ❑ Select the appropriate number of clusters according to the number of groups you wish to classify (10 is recommended). Provide the system with other information as directed in the MultiSpec tutorial

section on Unsupervised Classification: Clustering.

- ❑ Once the image has been clustered, note the area included in each cluster. If you know the land cover of an area, assign a land cover class from the MUC system to the cluster. If you do not know the land cover of an area, use the data from a Land Cover Sample Site within the area to assign the land cover class from the MUC system. If there are no Land Cover Sample Sites within the area of a cluster, perform the *Qualitative* or *Quantitative Land Cover Protocol* for a site within this area. If there are multiple sample sites within an area, use only one of these sites to make the land cover class assignment and reserve the others for use in the *Accuracy Assessment Protocol.*
- ❑ Rename each cluster to correspond with its appropriate MUC Level 4 classification.

Step 2: Save Your Image and Report Data

- ❑ Save the classified clustered image. Use the Project menu to copy it onto a disk as a TIFF file. If you have a color printer, print copies of your students' land cover map(s).
- ❑ Report your data to the GLOBE Student Data Archive by sending a copy of the TIFF containing your classified, clustered map. Use the address given in the *Implementation Guide*.